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ABSTRACT

Speech samples were collected from three 48-month-old children with Down's Syndrome over an 11-month period after Ss had reached the one word utterance stage. Each S's linguistic utterances were semantically evaluated in terms of M. Bowerman's, R. Brown's, and I. Schlesinger's semantic relational concepts. Generally, findings suggested that Ss symbolically represented their experiences through the same modes of representation available for normal children, and that there is a 2-year lag for these semantic relational concepts to appear in the language of Down's Syndrome children when compared to normal children. The semantic relational concepts in the Ss' early utterances were charted in the order of their appearance. (GW)

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A SEMANTIC-RELATIONAL-CONCEPTS BASED THEORY OF LANGUAGE ACQUISITION AS APPLIED TO DOWN'S SYNDROME CHILDREN: IMPLICATION FOR A LANGUAGE ENHANCEMENT PROGRAM

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The University of Minnesota Research, Development and Demonstration Center in Education of Handicapped Children has been established to concentrate on intervention strategies and materials which develop and improve language and communication skills in young handicapped children.

The long term objective of the Center is to improve the language and communication abilities of handicapped children by means of identification of linguistically and potentially linguistically handicapped children, development and evaluation of intervention strategies with young handicapped children and dissemination of findings and products of benefit to young handicapped children.

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A Semantic-Relational-Concepts Based Theory of Language Acquisition as Applied to Down's Syndrome Children: Implication for a Language Enhancement Program

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Most of the research into language acquisition processes, until very recently, was primarily concerned with syntax acqusition via the transformational grammar model. This bias toward the formal analysis of language was apparently a natural consequence of Chomsky's influence (Clark, 1973).

The availability of this paradigm within the field of linguistics had captured the attention of psycholinguists, resulting in an increased amount of children's language analyzed (Brown, 1973; Bloom, in press; Bowerman, 1973). As data accumulated, it soon became apparent that the transformational model, perhaps, provides an inadequate representation of young children's knowledge of sentence construction. Bowerman (1973) noted a number of such inadequacies as for example, the inappropriateness of the subject noun phrase. The transformational model's "subject noun phrase" was found by Bowerman to be far too abstract and powerful a grammatical concept than is needed to adequately represent the characteristics of children's early utterances. Children's sentential "subjects" tend to be restricted to the semantic function of agents. As the child matures linguistically, the semantic functions of his "subjects "become increasingly diverse to include "object acted upon," "person affected," "instrument" and "location." This may suggest that the

children are not searching for the means provided by their language for expressing the relations between grammatical concepts like "subject" and "predicate" as postulated by the tranformational model, but rather for a way to express the relations between a limited number of semantic concepts (Bowerman, 1973).

The general model of the transformational grammar has been questioned by Schlesinger (1971). That model suggests the input to the child to consist of linguistic data (the environmental utterances), and the output of the child to be the grammar: a set of rules relating utterances to meanings. The child cannot understand an utterance unless he recovers its deep structure. Schlesinger (1971) argued that it was difficult to see how some of the information contained in the deep structure could have been obtained by the child from the utterance he was exposed to where (1) the word order in deep and surface structures may be different and (2) the deep structure contains major categories like NP and VP that are highly abstract and may not even be apparent in the surface structure. Within the transformational model this issue appears to be resolved by advancing the "innateness" concept: the child has an innate ability to derive the deep structure meaning.

For the more skeptical psycholinguists, Schlesinger (1971) postulates the following language acquisition model: the input to the child includes, in addition to the linguistic data, its meaning through its association with specific situations. Thus the learning of a language takes place through the child seeing people or objects acting on other people or objects and observing how the adult expresses these relations in speech. The task of the model, now, is to derive from these situations- utterances

pairs a set of rules that show how utterances and meanings are paired. As complex as the task appears to be, it is within the scope of learning principles (Schlesinger, 1971). Unlike other learning based theories of language acquisition (Skinner, 1957), Schlesinger's model recognizes some elements of innateness in language development: Observations of children's early utterances in different languages (English, Finnish, Samoan and Luo [Bowerman, 1973]) reveal certain semantic relational concepts to occur in all speech samples, thus suggesting innate universal means through which humans symbolically represent their experiences. These semantic relational concepts include (1) agent-action, (2) action-object, (3) possession, (4) demonstratives, (5) attributions, and possibly others. Within this model, then, syntax can be thought of as a general abstract organizational structure which allows the child to express these semantic relational concepts in a variety of ways that may be unique but fully comprehensible to his community (Miller & Yoder, 1973). Syntax appears to be the linguistic-specific means that is made available to the child by his linguistic community in order to express semantic relational concepts. Not all semantic relational concepts appear in the language at the same time. Some must await the evolvement of a more advanced cognitive stage (Miller & Yoder, 1973).

Within Schlesinger's model, syntax is learned by the child observing how his mother's utterances are paired with specific situations. Thus, while the child is equipped with innate means to symbolically represent his experiences in such terms as agent-action, possession, etc., the rules of rearrangement, expansion, and combination of these semantic relational concepts are not innate but subject to learning principles.

No attempt was made for a comprehensive review of Schlesinger's model. It was intended to note some key elements that we believe may be important in understanding the language acquisition processes of mentally retarded children in general and Down's Syndrome children in particular. Very few studies have attempted to systematically analyze the language development processes of mentally retarded children (Miller & Yoder, 1973). A systematic analysis, in this domain, needs to contain developmental data of (1) the child's language and (2) his linguistic environment. Unfortunately, when mentally retarded children are diagnosed as having language difficulties, usually past their third birthday, it is too late to collect data on their linguistic environment to that point. Thus, we have reversed the order by examining the nature of the maternal linguistic environment of 24-month old normal children who in all likelihood will become normal speakers as well as the maternal linguistic environment of 24-month old Down's Syndrome children who in all likelihood will experience language difficulties. Results were reported to the last APA convention (Buium, Rynders, and Turnure, 1973).

About 11 months ago, these Down's Syndrome children reached the one-word utterance stage. We began to collect and analyze weekly speech samples from their language in order to respond to the following experimental questions (1) can the Down's Syndrome children's early utterances be described by the same semantic relational concepts that were found to dominate normal children's early utterances? In other words, does the Down's Syndrome child symbolically represent his experiences in any way that is different from the way normal children do? (2) Do the cognitive deficiencies of the Down's Syndrome child prevent him from attaining any of the semantic relational concepts used by normal children?

If the findings indicate that Down's Syndrome children's semantic

relational concepts do not deviate from normals, it might limit the search for these children's language deficiencies to the realm of syntax acquisition, namely to learning how to rearrange, expand and combine the semantic relational concepts via linguistic-specific syntactical rules. Our long term project, including the present study, bears directly on this issue.

Method

Procedure: Due to the psycholinguistic nature of the investigation, it was decided to follow the pattern of other psycholinguistic studies in which a limited number of children would be used having their language samples subject to extensive analyses (Brown, 1973; Bowerman, 1973).

Three 48-month old Down's Syndrome children and their mothers were supplied with cassette tape recorders for weekly tapings of natural mother-child play situations involving verbal interactions. Tapes were collected at the end of each week, and new ones supplied. The period of data collection lasted for 11 months.

Parameters of investigation: Each of our subject's linguistic utterances were semantically evaluated, i.e., whether they could be appropriately described in terms of Bowerman's (1973), Brown's (1973), or Schlesinger's (1971) semantic relational concepts.

Data analysis: Each weekly tape was transcribed by more than one listener. The linguistic structure that listeners agreed upon in their separate transcriptions were accepted into the child's linguistic protocal.

Results and Discussion

Table 1 presents the semantic relational concepts that appeared in the language of three Down's Syndrome children in the course of 11 months. (Appendix A presents a sample of the collected language data.)

Insert Table 1 about here

All the children's utterances were accounted for by the semantic relational concepts that previously were found to appear in normal children's early utterances; also, all the reported semantic relational concepts (Brown, 1973; Bowerman, 1973; Schlesinger, 1971) that were found to occur in normal children's language, were found in our subject's language.

As predicted, not all semantic relational concepts appeared within the same time. Instead, they followed a certain order, perhaps an order of cognitive demand as suggested by Bowerman (1973), or an increased amount of specificity with which semantic functions are expressed, as suggested by Miller & Yoder (1973). The utterances in Table 1 are arranged according to their order of appearance. The ordering phenomena is not necessarily in disagreement with Schlesinger's model of innate semantic relational concepts; it merely suggests that more complex concepts must await an appropriate level of cognitive development for their appearance.

Generally, the present findings suggest that (1) these Down's Syndrome children appear to symbolically represent their experiences through the same modes of representation available for normal children and (2) there is a two year lag for these semantic relational concepts

to appear in the Down's Syndrome children's language when compared to normals.

Schlesinger's model suggests the child has innate modes of symbolic representation such as agent-action, possession, etc. However, the rules of these modes' rearrangement, expansion or combination, must be learned. Within this model,then, the syntax provides the child with the linguistic-specific means of expressing the semantic relational concepts in a vast number of sentences. Syntax is learned by the child's observing how the environmental utterances relate to given situations. Little information is available on the nature of the Down's Syndrome child' environmental linguistic experiences. Such knowledge would suggest the extent to which the child is exposed to similar sets of paired situations- utterances, compared to the normal child, from which to abstract syntactical rules. At the last APA convention we reported the results of the maternal linguistic environment of Down's Syndrome children's investigation (Buium, Rynders & Turnure, 1973). It was found that Down's Syndrome children were exposed (a) to a higher number of utterances, yet to a lower mean length of utterances; (b) to a higher number of sentences, yet to a lower mean length of sentences; and (c) they were exposed to a higher frequency of grammatically incomplete sentences, imperative sentences, and single word responses. Conversely, they were exposed to a lower frequency of indefinite pronouns, conjunctions, WH-type questions, and the grammatical forms that are associated with Levels 3 and 4 of the main verb classification: (a) present and past tense markers; (b) irregular past forms; (c) copula and auxiliary

am, are, was, were; (d) can, will, may + verb; and (e) obligatory do + verb and emphatic do + verb.

Within Schlesinger's model of language acquisition, the child that is exposed to a restricted linguistic code has less linguistic data to operate in rearranging, expanding, and combining the semantic relational concepts that are available to him. The early maternal linguistic environment of our subjects had consisted of such a restricted code. Although our subjects appear to have the same modes of symbolic representation as normals, the means for these concepts' rearrangement, expansion, and combination, namely the syntax, seems to be made available to them on a different signal construction format.

The findings of our long term project (the 1973 study and the present one) appear to suggest to us the design of a program that consists primarily of pairing the systematic presentation of syntactical rules (that gradually vary in complexity) by the mother with the appropriate situations designed to reflect the semantic relational concepts available to the child at the time, thus allowing the child the verbal manipulations of these staged situations-utterances pairs. This program must incorporate at least four basic elements: (1) the developmental hierarchy of syntactical rules such as suggested by Lee and Cantor (1971); (2) specific procedures designed to improve the learning processes of mentally retarded children, such as methods for memory enhancement (Turnure, Buium & Thurlow, 1974); (3) a set of activities, possibly the early childhood activities developed by Rynders & Horrobin (1974) which will provide syntax-meaning pairs in

a focused, interesting, and manageable way, and (4) complete linguistic analysis of the children's utterances for the existing semantic relational concepts.

Given the child's knowledge of certain semantic relational concepts, the mother pairs the least complex syntactical rule with an explicit situation in a way that embeds within it the existing semantic concept. This is followed by a more complex rule, etc. The pairing itself is designed to overcome the Down's Syndrome children's learning difficulties by employing specific paired-associates methods (Turnure, Buium & Thurlow, 1974). Such a program is being developed in Minnesota.

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Table 1

The Semantic Relational Concepts in Three Down's Syndrome Children's Early Utterances, Presented in the Order of Their Appearance

Two Word Utterance

agent - action
action - object
agent - object
possession
attributions
demonstratives
location - object
locatives
negations (rejection, denial)
interrogatives
recurrance
person affected
dative

Three Word Utterance

agent - action - object
agent - action - location
agent - location - action
action - modifier - object
agent - modifier - action

APPENDIX A

Modifier-Noun

a mom

(big bird)

two eye

one Bob

a man

a cow

the bus

a bus

one eye

a cookie

a book

a horse

tiny nose

a egg

a frog

wa (l) 2 eye

- the hole

- the bu (book)

the bir(d)

a mout (mouse)

a cake

baby chick

a rhino

a bithy cake (birthday)

Modifer-Noun (Continued)

akeam co (ice cream cold)

da book (the book)

de (the) cow

a book

the ball

happy cake

big car

da sun

a boat

high chair

a swing

big big car

da spoon

a fork

big drink

a farm

cookie mo(nster)

a swing

a cookie

3 ball

2 horse

good bike

big wheel

1 2 foot

1 2 feet

Modifer-Noun (Continued)

wheel big wheel

big brain

two feet

happy kid

happy kid cake

orange juice

Person Affected

awa (I want)

see de bir(d)

- I wa(nna) eat

-- I like juice

I wanna eat

like cake

I want pop

I like talk

I do too

I want kiss

want 2 cookie

I see

I like Cathy

Locative - Action

go out be beep (go out to ride)

play outsi

go outside

outside play

go car

go in car

Action - Object (Inanimate)

ki(ck) ba (kick ball)

flap wing

ea juice (eat juice)

ged da ball (get the ball)

read book

eat jello

see book

Locative - Object

down-atie (Lassie)

wa boat (boat in the water)

outsi wawa (water is outside)

Kitty up

Scott gampa (Scott is at granpa)

gampa work (granpa is at work)

Kim home

Wayne home

kids wa

out wa

boat wa

gampa barn

mom bebeep (mom is in the car)

Scott down

Bob awside

Scott home

Scott wawa

Kim up

Lassie house

dog rain

girl beep

Lassie outsi

all up

Locative - Object (Continued)

Scott - wa

car up on

up car up

Diko wawa

Acky out

mom work

Wayne work

Kim doctor

Acky up

fish wa

Scott up

mommy down

bebeep down

And(y) goul (school)

And(y) up

char (JR) outsi

beer (bear) hoke)

JR outside

cake floor

Andy School

zoo peacock

here book

apples in tree

Agent (Animate)-Object (Animate)

gapa cow (grandpa - cow) (grandpa has cow)

mom ackie (Mom is with Ricky)

mor Oscar

gampa pig

Agent (Animate)-Object (Inanimate)

Mom chip

Mom gum

jar (JR) juice

Kay book

lion egg

bear bike

seal ball

mom lunch

mom toy

Scott hammer

Daddy hammer

Agent (Animate)-Action

I go

atie jump (Lassie Jump)

Oscar boom

I go

gampa come

Wayne broke

mom come

gampa work

I go

KiKi walk

Lassie eat

WAyne come

Acky done

Lassie walk

I sing

I sit

cookie monster eat

mommy yeat

girl swing

I talk

I eat

JR eat

Kay read

elephant do

Possesive

Scott bokk

mom gum (this is Mom's gum)

Rick gum

Scott bike

Mom haush

Mom Tos (this is Mom's toast)

gampa cake

bi bur eyes (these are big bird's eyes)

Acky toast

Sco toast

Bob house

gampa tato

Acky book

And(y) cake

Shar igeam (J.R. ice cream)

my cake

doggie teeth

my shoe

Introducer + Variable

tha a song (that's a song)

ats a be(d) (that's a bed)

ats a bir(d) (thats a bird)

that's a ball

that's soup

it's a foul (flower)

ere's a book (there's a book)

dat a balloon (that's a ballon)

mom a doggie

A-apple

here dat pup

dat a seal

here foot

here toe

deres a foot

here da blanket

dats a dog

that's a rooster

Notice

ha mom

hi mom

hi bur

hi Bob

mom hey

hi barn

hi -

hi da

hi Way

hi Bob

oh animal

oh ear

oh animals

hi Oscar

Recurrence

more Scott

more gum

ju akie more (Juice & Cookie more)

mo book (more book)

mo apple (more apple)

more Lassie

ju more

mom more

mo eggs

more haush

gampa more

more up

more water

more eat

more cake

more milk

Rejection

no da

no bark

no mom

no doctor

Lassie no

no apple

JR no

no ear

no eagle

Non-existance

all gone

Kim all gone

all gone haush (house)

Introducer + Adjective

dat hot

dat tall

Agent-Action-Object

I said bird

I said foul (flower)

Bob got ear

King eat cheese

I got cookie

Agent-Action-Location

Sco go wuk (Scott go work)

Bob go up

Action-Modifier-Object

read da book

read a book

got da balloon

climb a tree

Wh Question

what zat?

mom whozat ?

whazat pig ?

who ga wawa?

whatsa mom?

whasa?

where gay-r?

whas this?

where's the ba(ll)?

whaz zebra (where's the zebra)?

where buk (book)?

whaz za box?

wheres the buk?

wheres a buk?

where da pig?

where de (the) cow?

whereG?

where da G?

what trash?

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